

**VIRGINIA DEPARTMENT OF TRANSPORTATION**  
***TRAFFIC ENGINEERING DIVISION***  
**INSTRUCTIONAL & INFORMATIONAL MEMORANDUM**

<b>GENERAL SUBJECT:</b> Portable Temporary Rumble Strips (PTRS)	<b>NUMBER:</b> IIM-TE-386.1
	<b>SUPERSEDES:</b> Nov 6, 2017
<b>SPECIFIC SUBJECT:</b> Revised Guidelines for the use of Portable Temporary Rumble Strips (PTRS)	<b>DATE:</b> Oct. 15, 2018
	<b>SUNSET DATE:</b>
<b>APPROVAL:</b>  <div style="text-align: center;">           /original signed by/            Raymond J. Khoury, P.E.            State Traffic Engineer            Richmond, VA            October 15, 2018         </div>	

Changes are shaded

**CURRENT REVISION**

This memorandum was revised changing the use of Portable Temporary Rumble Strips (PTRS) from a “should” to a “shall” condition for flagging operations on two-lane roadways, greater than three hours but less than three consecutive days in duration.

**CONTENTS**

**Traffic Engineering Division Memorandum IIM-TE-386.1**

Purpose and Need .....	1
Effective Date .....	2
Application .....	2
Design and Layout .....	3
Attachment A .....	5

**PURPOSE AND NEED**

Distracted and drowsy driving crashes have been on the rise recently both within Virginia and nationally. To increase motorists attention when entering flagging operations on two-lane roadways the Department is requiring the use of portable temporary rumble strips (PTRS).

The advantages of using PTRS include:

- It creates an audible noise and vibration to approaching motorists,

- Raises motorists attentiveness to flagging operations,
- Provides an audible warning to flaggers, increasing their awareness of approaching vehicles and;
- Helps reduce rear end collisions and roadway departures

This Memorandum and the attached Guidelines provide additional guidance beyond what is shown in the [2011 Virginia Work Area Protection manual](#) (VWAPM) for flagging operations on two-lane roadways.

## **EFFECTIVE DATE**

The effective date for this Memorandum is as follows:

- State forces – effective immediately for state forces in possession of PTRS when performing a lane closure on two-lane roadways using flaggers, with complete implementation by all state forces with the purchase of additional PTRS units by January 1, 2019.
- Design-Bid-Build Contracts and Design-Build/PPTA Projects – This Memorandum shall be effective for projects advertised after July 1, 2019.
- State and Federally Funded Projects Administered by VDOT - This Memorandum shall be effective for projects advertised after July 1, 2019.
- ASD Contracts – existing ASD Contracts (including hired equipment and other forms of ASD contracts) should be modified as soon as possible (but no later than July 1, 2019) to include the use of PTRS.
- Land Use Permits (including work performed by utilities) – This Memorandum does not apply to land use permits, but permittees are encouraged to consider the use of PTRS in appropriate locations.

## **APPLICATION**

### **Standard**

1. Portable Temporary Rumble Strips (PTRS) **shall** be used when the following conditions are met concurrently:
  - a. Work operations involving flaggers occurring on a two-lane roadway during daylight hours (See Notes and Figure 1 in Attachment A);
  - b. Work duration of the activity at a location is greater than three hours but less than 72 consecutive hours;
  - c. Existing posted or regulatory speed limit is 35 mph or greater; and
  - d. Roadway has a marked centerline (indicating at least 500 vehicles per day).
2. PTRS shall be installed at the beginning of a non-stationary flagging operation (See Notes and Figure 2 in Attachment A), however they will not be required to be repositioned as the work advances.
3. PTRS shall not be used on loose gravel, bleeding asphalt, heavily rutted pavements or unpaved surfaces, nor shall they be placed through pedestrian crossings or marked bicycle lanes. PTRS are not required if the work is of emergency nature, or if the work zone is in rain, snow or icy weather conditions.

Deviation from the above application requirements is allowed if engineering judgement indicates the deviation to be appropriate. These deviations shall be properly documented using the Work Zone Safety Checklist form from Appendix B of the VWAPM.

State Forces - If multiple work activities are planned where PTRS units are required but are unavailable, the available unit(s) should be used in the location(s) with the greatest traffic volume and documentation for the reason PTRS were not available should be made using the Work Zone Safety Checklist form from Appendix B of the VWAPM.

### **Guidance**

1. Portable Temporary Rumble Strips (PTRS) **should** be:
  - a. Considered for use on unmarked two-lane roadways at least 18 feet wide or wider.
  - b. Located in advance of horizontal curves when possible so they are visible to approaching motorists.
  - c. Installed using Section 6G.25 Installing/Removing Temporary Traffic Control devices of the VWAPM.

### **Option**

1. Portable Temporary Rumble Strips (PTRS) **may** be:
  - a. Used at posted speeds less than 35 mph when spaced in accordance with Design and Layout note 6 (below) and may be used on a one-lane, two-way application which utilizes an Automated Flagger Assistance Device (AFAD) or a portable traffic signal.
  - b. Used on a divided four-lane roadway (non-limited access) by state forces (See Notes and Figure 3 in Attachment A) at the discretion of the Resident Engineer/Administrator and in coordination with Traffic Engineering in the central office.
  - c. Used during nighttime operations.

## **DESIGN AND LAYOUT**

1. PTRS shall be hinged strips for rapid deployment and shall be black or orange and the colors shall not be mixed within the work zone.
2. PTRS shall consist of three rumble strips placed perpendicular to the centerline and parallel to one another in accordance with the spacing requirements in note 6, below. The rumble strips shall be installed across the entire travel lane but not intrude into the opposing travel lane. It may be necessary to extend the PTRS onto the shoulder.
3. When the PTRS are installed, the RUMBLE STRIPS AHEAD (W20-V26) sign shall be utilized. PTRS shall be placed at the same time the advanced warning signs are installed.
4. The preferred location of the PTRS in two-lane operations is adjacent to the BE PREPARED TO STOP (W3-4) sign but the PTRS can be moved to other locations within the advance warning area based on field conditions and traffic queue. An optional set of PTRS may be used at the beginning of the buffer space (See Notes and Figure 1 in Attachment A).
5. The preferred location of the PTRS in four lane (non-limited access highway) operations by state forces is in advanced of the RIGHT (LEFT) LANE CLOSED AHEAD (W9-3R) sign and adjacent to the RUMBLE STRIPS w/ directional arrow (W20-V28) sign but the PTRS can be moved to other locations within the advanced warning area based on field conditions and traffic queue. An optional set of PTRS may be used at the beginning of the buffer space (See Notes and Figure 3 in Attachment A).
6. Spacing between each strip shall be as follows:

Posted/Statutory Speed Limit	< 40 mph	40 – 49 mph	≥ 50 mph
PTRS Spacing (Center to Center)	10 Feet	15 Feet	20 Feet

7. When traffic queues prior to the PTRS, the PTRS and rumble strip signs may need to be relocated in advanced of the queue to better serve as a warning device to motorists.
8. Removal of PTRS should be accomplished with the removal of the advance warning signs.

## **ATTACHMENT A**

**Figure 1 Typical Traffic Control Notes -  
Lane Closure on a Two-Lane Roadway Using Flaggers and PTRS**

**Standard:**

1. Tables 6H-2, 6H-3, 6H-4 and 6H-5 shall be used for installing temporary traffic control devices.

**Guidance:**

2. Care should be exercised when establishing the limits of the work zone to ensure maximum possible sight distance in advance of the flagger station and transition, based on the posted speed limit and at least equal to or greater than the values in Table 6H-3. Generally speaking, motorists should have a clear line of sight from the graphic flagger symbol sign to the flagger.

**Standard:**

3. Flagging stations shall be located far enough in advance of the work space to permit approaching traffic to reduce speed and/or stop before passing the work space and allow sufficient distance for departing traffic in the left lane to return to the right lane before reaching opposing traffic. Intersecting roadways in between the work zone's flagger stations shall be controlled by a flagger.
4. A shadow vehicle with at least one high intensity amber rotating, flashing, or oscillating light shall be parked 80'-120' in advance of the first work crew.

**Option:**

5. A supplemental flagger may be required in this area to give advance warning of the operation ahead by slowing approaching traffic prior to reaching the flagger station or queued traffic.

**Guidance:**

6. The location of the PTRS should be adjacent to the BE PREPARED TO STOP (W3-4) sign. If the queue of traffic reaches the BE PREPARED TO STOP (W3-4) sign then the signs and PTRS, should be readjusted at greater distances. The PTRS and the RUMBLE STRIP AHEAD sign can be moved to other locations within the advance warning area based on field conditions.
7. When a highway-rail crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the highway-rail grade crossing, the temporary traffic control zone should be extended so that the transition area precedes the highway-rail crossing (see Figure TTC-56 for additional information on highway-rail crossings).

**Standard:**

8. At night, flagger stations shall be illuminated, except in emergencies.

**Option:**

9. Cones may be eliminated when using a pilot vehicle operation or when the total roadway width is 20 feet or less.

**Standard:**

10. The spacing of the PTRS shall be:

Posted Speed	< 40 mph	40 – 49 mph	≥ 50 mph
PTRS Spacing (Center to Center)	10 Feet	15 Feet	20 feet

**Support:**

11. For additional information, see TTC-23 in the 2011 Virginia Work Area Protection manual.

The diagram illustrates a two-lane road construction zone with traffic flowing in both directions. Key components include:

- Signage:**
  - Approach (Left Side):** W20-1 (Road Work Ahead), W20-4 (One Lane Road Ahead), W20-V26 (Rumble Strips Ahead), W3-4 (Be Prepared to Stop), and W20-7 (Flagger Station).
  - End of Zone (Right Side):** W20-1 (Road Work Ahead), W20-4 (One Lane Road Ahead), W20-V26 (Rumble Strips Ahead), W3-4 (Be Prepared to Stop), and W20-7 (Flagger Station).
- Dimensions and Spacing:**
  - 500' ± distance between the start and end of the work zone.
  - 50' - 100' spacing for the first set of signs.
  - SEE NOTE 1 for intermediate sign spacing.
  - 80' - 120' distance for the shadow vehicle.
  - 50' - 100' spacing for the second set of signs.
  - SEE NOTE 2 for the flagger station location.
  - SEE NOTE 1 for the final set of signs.
- Other Features:**
  - Shadow Vehicle:** A vehicle positioned behind the work zone, required for safety.
  - Flagger Station:** A designated area for the flagger, marked with a red flag.
  - Optional PTRS:** Optional Port and Trailer Restraints within the buffer area.
  - Center Line:** The roadway center line is shown with a dashed yellow line.
  - Notes:** Various notes (NOTE 1, NOTE 2, NOTE 5, NOTE 6, NOTE 8) refer to specific details and standards.

## Figure 2 Typical Traffic Control Notes –

### ***Non-Stationary Operation on a Two-Lane Roadway Using Flaggers and PTRS***

#### **Standard:**

1. Tables 6H-2, 6H-3, 6H-4 and 6H-5 shall be used for installing temporary traffic control devices.

#### **Guidance:**

2. Care should be exercised when establishing the limits of the work zone to ensure maximum possible sight distance in advance of the flagger station and transition, based on the posted speed limit and at least equal to or greater than the values in Table 6H-3. Generally speaking, motorists should have a clear line of sight from the graphic flagger symbol sign to the flagger.

#### **Option:**

3. Where Right-of-Way or geometric conditions prevent the use of 48" x 48" signs, 36" x 36" signs may be used.

#### **Standard:**

4. Flagging stations shall be located far enough in advance of the work space to permit approaching traffic to reduce speed and/or stop before passing the work space and allow sufficient distance for departing traffic in the left lane to return to the right lane before reaching opposing traffic (see Table 6H-3 on Page 6H-5).
5. The Flagger (W20-7) symbol sign shall stay within ½ mile of each flagger.

#### **Guidance:**

6. Additional Flagger symbol signs should be placed at ½ mile intervals and either erected by the approaching flagger, or taken down as the operation proceeds past this point.
7. When a highway-rail crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the highway-rail grade crossing, the temporary traffic control zone should be extended so that the transition area precedes the highway-rail crossing (see Figure TTC-56 for additional information on highway-rail crossings).
8. If the queue of traffic reaches the BE PREPARED TO STOP (W3-4) sign, then the advance warning signs should be readjusted at greater distances.

#### **Option:**

9. A SLOW (W21-V10) sign may be installed between the first and second Flagger Symbol (W20-7) sign.

#### **Standard:**

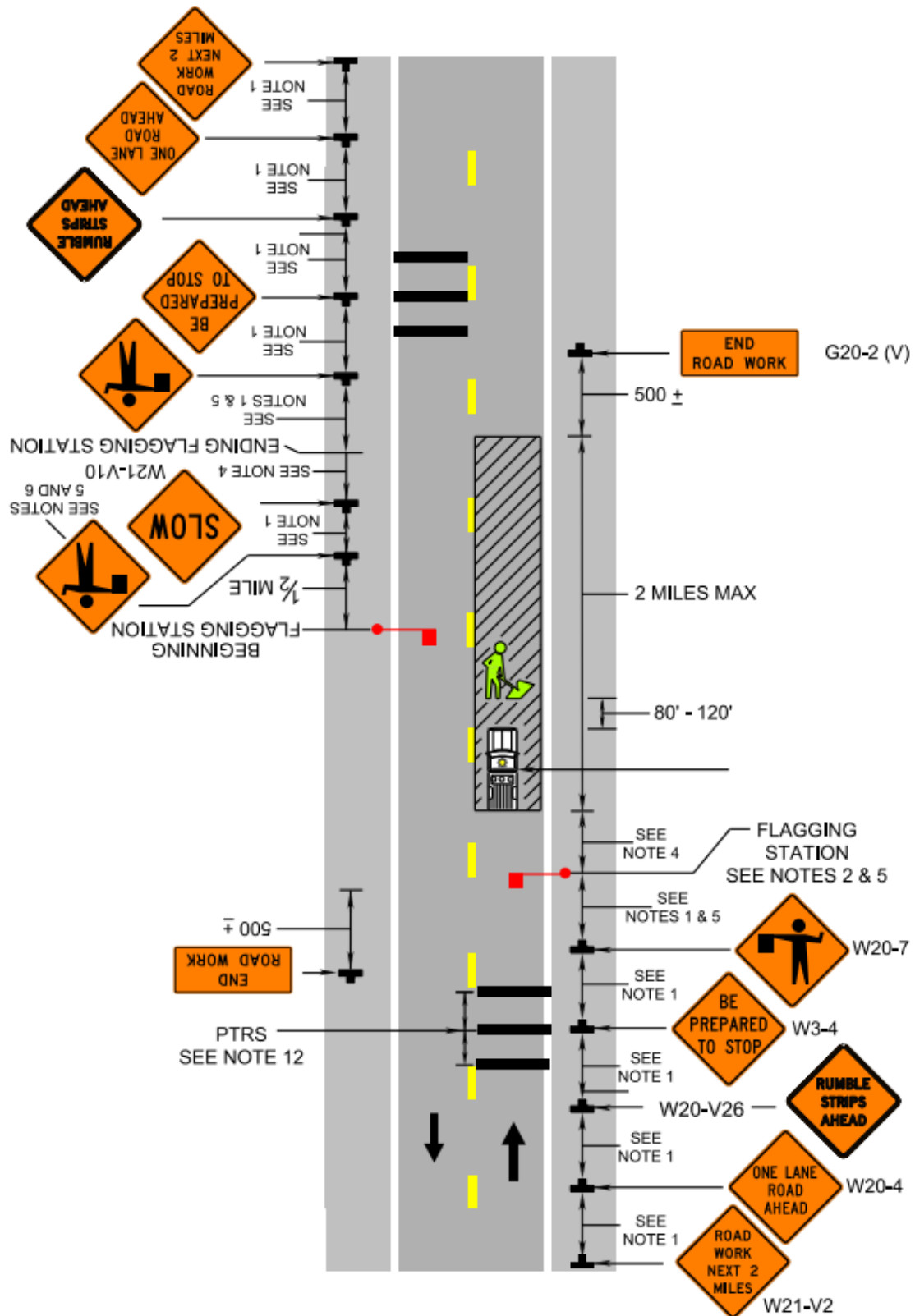
10. A shadow vehicle with at least one amber rotating, flashing or<sup>1</sup> oscillating lights shall be parked 80'-120' in advance of the first work crew.
11. The maximum length of the work area shall be two miles.
12. The spacing of the portable temporary rumble strips shall be:

Posted Speed	< 40 mph	40 – 49 mph	≥ 50 mph
PTRS Spacing (Center to Center)	10 Feet	15 Feet	20 feet

#### **Support:**

13. For additional information, see TTC-24 in the 2011 Virginia Work Area Protection manual.

**FIGURE 2 – TYPICAL INSTALLATION ON A NON-STATIONARY FLAGGING OPERATION**





**Figure 3 Typical Traffic Control Notes –  
Lane Closure on a Multi-Lane Roadway Using PTRS**

**Standard:**

1. On divided highways having a median wider than 8', right and left sign assemblies shall be required.
2. Tables 6H-2, 6H-3, 6H-4 and 6H-5 shall be used for installing temporary traffic control devices.

**Guidance:**

3. Care should be exercised when establishing the limits of the work zone to insure maximum possible sight distance in advance of the transition, based on the posted speed limit and at least equal to or greater than the values in Table 6H-3. For Limited Access highways a minimum of 1000' is desired.
4. The location of the PTRS should be adjacent to the RUMBLE STRIP WITH ARROW (W20-V28) sign. If the queue of traffic reaches the RUMBLE STRIP WITH ARROW sign, then the rumble strip signs and the PTRS, should be readjusted at greater distances.
5. All vehicles, equipment, workers, and their activities should be restricted to one side of the pavement.

**Standard:**

6. PTRS shall not be placed through pedestrian crossings.
7. PTRS shall not be placed on roadways used by bicyclists unless a minimum clear path of 4 feet is provided at each edge of the roadway or on each paved shoulder.

**Option:**

8. An additional array of PTRS may be installed at the beginning of the buffer area.

**Standard:**

9. The spacing of the PTRS shall be:

Posted Speed	< 40 mph	41– 49 mph	> 50 mph
PTRS Spacing (Center to Center)	10 Feet	15 Feet	20 feet

10. TTC-13 shall be used to install the temporary traffic control. If Shadow Vehicle 1 cannot run completely on the shoulder and is partially in the travel lane, it shall be equipped with a truck-mounted attenuator. RUMBLE STRIP AHEAD signs shall be installed prior to placing Portable Temporary Rumble Strips (PTRS).
11. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity amber rotating, flashing, or oscillating lights but can be used to supplement the amber rotating, flashing, or oscillating lights.
12. A shadow vehicle with either a Type B or C arrow board operating in the caution mode, or at least one high intensity amber rotating, flashing, or<sup>1</sup> oscillating light shall be parked 80'-120' in advance of the first work crew. When the posted speed limit is 45 mph or greater, a truck-mounted attenuator shall be used.
13. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed as needed.

**Support:**

14. For additional information, see TTC-16 or TTC-17 in the 2011 Virginia Work Area Protection manual.

**FIGURE 3 - TYPICAL INSTALLATION ON A MULTI-LANE ROADWAY**

